spectacular growth. The cellular carriers are demonstrably able to expand capacity.

Second, cellular was designed to allow incremental growth in capacity by dividing cells. Most systems in the country have not reduced cell sizes to those levels achieved in the most congested systems in the very largest markets.

Third, high trading prices have been paid for cellular companies comprising systems in small-to-medium sized markets. For example, a little more than a year ago Bell Atlantic reportedly paid $202 a pop for Metro Mobile, a company with systems in Connecticut.[23]

Fourth, cellular systems will shortly be able to move to digital capability. For example, the systems in Los Angeles are expected

Fifth, the availability of these digital technologies does not appear to have affected the market value of cellular companies whereas new competitive developments have had well documented effects on market values.[24] If the projected profits and related market valuations reflected scarcity rents, the advent of digital technology should have exerted dramatic downward pressure on the market prices of cellular companies.

In sum, the high profits projected by this report's discounted cash flow analysis, which is consistent with the market's valuation and the analysis of others who have examined the issue, cannot be explained away by either spectrum scarcity or other sources of scarcity rents.

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24 Market prices for independent cellular company stocks fell by 5 percent in response to mere rumors that Congressman Dingell was proposing a bill that might make spectrum available for commercial services including new cellular services. See for example, Smith Barney, "Cellular Industry Quarterly Update," September 6, 1989, at 2. In response to this market reaction [illegible]

APPENDIX

SUMMARY TABLE

Estimates of Cellular Cashflows, Market Valuations and the Resulting Consumer Losses

Scenarios (Base case is first) (Only changed assumptions shown in succeeding cases)	Per Pop Value	Cumulative Consumer Loss (Billions)	Cumulative Consumer Loss (Bils.) (PV at 12%)
1. o 255 million pops o 12.24% penetration o 7.6 million subs o 116 min./sub/mo. o min. decline 8%/year o price = $.39/min. o price declines 5% from '96 to 2000 o see tables for other assumptions	$89.27	$18.2	$8.1
2. o price remains constant	$104.11	$23.7	$10.2
3. o price increases 4%--'96 onward	$120.58	$29.0	$12.3
4. o 125 min./sub/mo. min. decline 3%/year	$125.65	$33.5	$15.1
5. o 15.89% penetration (growth occurs in out years) o price increases 4%--'96 onward o 125 min./sub/mo. min. decline 3%/year	$207.13	$53.4	$22.6

TABLE 1

PROJECTED NATIONAL CELLULAR REVENUES

YEAR	POPULATION (MILLIONS)	PENETRATION (2 SYSMS) (%)	SUBSCRIBERS (2 SYSMS) (MILLIONS)	AVERAGE SUBSCRIBER MINUTES PER MONTH	SUBSCRIBER MONTHLY ACCESS FEE	MONTHLY REVENUE PER SUBSCRIBER	ANNUAL REVENUE PER SUBSCRIBER	TOTAL ANNUAL SERVICE REVENUES (2 SYSMS) (MILLIONS)
	a	b	c	d	e	f	g	h
1992	255	2.98%	7.60	116	$23	$68	$901	$6,846
1993	258	3.69%	9.50	107	$23	$65	$853	$8,103
1994	260	4.57%	11.88	98	$23	$61	$809	$9,607
1995	263	5.65%	14.84	90	$23	$58	$769	$11,409
1996	265	6.71%	17.81	83	$23	$54	$710	$12,647
1997	268	7.98%	21.38	76	$23	$50	$659	$14,082
1998	271	9.48%	25.65	70	$23	$47	$614	$15,750
1999	273	10.32%	28.22	65	$23	$44	$575	$16,222
2000	276	11.24%	31.04	60	$23	$41	$541	$16,783
2001	279	12.24%	34.14	55	$23	$40	$522	$17,813

COLUMN EXPLANATION

a Pops are based on 250 million pops in 1990 with 1% annual growth. E. Greenberg & C. Lloyd, "POP Out: The Changing Dynamics of the Cellular Telephone Industry," Morgan Stanley, April 23, 1991 at 13, 15, & Appendix N.

b c/a

c There are 7.6 million subscribers countrywide in 1992, CTIA, March 17, 1992; for first 3 years thereafter the annual rate of growth was assumed to be 25%, the next three years, 20%, and the last three years, 10%. The resulting penetration rates are below or consistent with most observers' projections.

d 116 minutes/subscriber/month with 8% annual decline. See Morgan Stanley at 20. (80% of customers are business customers averaging 175 minutes a month. CBO at 26).

e Monthly access fee from Morgan Stanley at 20.

f e + d * $.39/min.; price taken from Morgan Stanley at 16; price falls 5% from 1996 to 2000. Morgan Stanley at 23.

g f * 12 months/year plus 10% of total revenues for roaming; these estimates are consistent with Morgan Stanley.

TABLE 2

NATIONAL CELLULAR REVENUES, OPERATING EXPENSES AND OPERATING PROFIT FOR TWO SYSTEMS

YEAR	TOTAL ANNUAL SERVICE REVENUES (2 SYSMS) (MILLIONS)	OPERATING EXPENSES LEC ACCESS (MILLIONS)	OTHER OPERATING (MILLIONS)	MARKETING (MILLIONS)	TOTAL OPERATING EXPENSE (MILLIONS)	OPERATING PROFITS (MILLIONS)	OPERATING PROFIT MARGIN
	i	j	k	l	m	n	o
1992	$6,846	$529	$730	$1,520	$2,779	$4,067	59%
1993	$8,103	$608	$912	$1,805	$3,325	$4,778	59%
1994	$9,607	$700	$1,140	$2,138	$3,977	$5,630	59%
1995	$11,409	$804	$1,425	$2,523	$4,753	$6,656	58%
1996	$12,647	$888	$1,710	$2,375	$4,973	$7,674	61%
1997	$14,082	$981	$2,052	$2,672	$5,704	$8,378	59%
1998	$15,750	$1,082	$2,462	$2,992	$6,537	$9,213	58%
1999	$16,222	$1,095	$2,709	$1,667	$5,471	$10,750	66%
2000	$16,783	$1,109	$2,980	$1,693	$5,781	$11,002	66%
2001	$17,813	$1,122	$3,277	$1,707	$6,106	$11,707	66%

COLUMN EXPLANATION

i	h
j	c * d * $.05/min * 12 months/year, Morgan Stanley at 16.
k	$8/month * 12 months/year * c, Morgan Stanley at 16.
l	(c - (c from previous year) * $1000; the $1000 per net new sub is decreased $50 each year.
m	j + k + l
n	i - m
o	n/i

TABLE 3

CELLULAR INVESTMENT FOR 2 SYSTEMS

YEAR	GROSS PLANT (BOY) (MILLIONS)	CAPITAL ADDITION (MILLIONS)	CAPITAL REPLCMNT (MILLIONS)	CAPITAL EXPENSE (MILLIONS)	AVERAGE GROSS (MILLIONS)	DEPRECIATN (MILLIONS)	NET PLANT (MILLIONS)
	p	q	r	s	t	u	v
1992	$8,670	$1,233	$217	$1,450	$9,287	$929	$6,936
1993	$9,903	$1,597	$434	$2,030	$10,701	$1,070	$7,896
1994	$11,500	$1,691	$594	$2,285	$12,345	$1,234	$8,946
1995	$13,190	$1,555	$805	$2,360	$13,968	$1,397	$9,910
1996	$14,746	$1,307	$1,055	$2,362	$15,399	$1,540	$10,732
1997	$16,052	$1,278	$1,327	$2,605	$16,691	$1,669	$11,668
1998	$17,331	$523	$1,653	$2,177	$17,592	$1,759	$12,085
1999	$17,854	$550	$1,785	$2,335	$18,129	$1,813	$12,608
2000	$18,404	$472	$1,839	$2,311	$18,640	$1,864	$13,054
2001	$18,876	$492	$1,896	$2,387	$18,876	$1,888	$13,554

COLUMN EXPLANATION

p first year based on 2*$17*a which is consistent with CTIA, March 17, 1992. Thereafter p from previous year + q. Although this figure does not include estimates for the scarcity value of the spectrum, based on NTIA estimates of the value of broadcast spectrum I do not expect that this adjustment would materially affect the results in this analysis.

q capital cost of new subs plus digitization, Morgan Stanley, Appendix O

r replacement cost of capital; Morgan Stanley, Appendix O

s q + r

t average of p & p from succeeding year

u .1 * t

v v from previous year + s - u; first year is assumed to be 80% of gross plant which is the same ratio used in 1992 by Morgan Stanley, Appendix O. This estimate is consistent with those of Shew and Malarkey Taylor. See W. B. Shew, "Tobin's Q for Cable Television, Media and Telecommunications: A Comparative Assessment", Putnam, Hayes & Bartlett, at 14-16.

TABLE 4

CUMULATIVE AFTERTAX CASH FLOW

YEAR	TAXABLE OPERATING PROFIT (MILLIONS)	AVERAGE GROSS PLANT (MILLIONS)	LESS DEPREC-IATION-10% (MILLIONS)	EQUALS TAXABLE INCOME (MILLIONS)	LESS INCOME TAXES (MILLIONS)	EQUALS NET INCOME (MILLIONS)	LESS CAPITAL EXPENSE (MILLIONS)	PLUS DEPREC-IATION (MILLIONS)	EQUALS: AFTER TAX CASH FLOW (MILLIONS)	CUMULATIVE PRESENT VALUE AT 0.12 (MILLIONS)
	w	x	y	z	aa	ab	ac	ad	ae	af
1992	$4,067	$9,287	$929	$3,139	$1,130	$2,009	$1,450	$929	$1,488	$1,488
1993	$4,778	$10,701	$1,070	$3,708	$1,335	$2,373	$2,030	$1,070	$1,413	$2,455
1994	$5,630	$12,345	$1,234	$4,396	$1,583	$2,813	$2,285	$1,234	$1,763	$3,710
1995	$6,656	$13,968	$1,397	$5,259	$1,893	$3,366	$2,360	$1,397	$2,402	$5,236
1996	$7,674	$15,399	$1,540	$6,134	$2,208	$3,926	$2,362	$1,540	$3,104	$6,998
1997	$8,378	$16,691	$1,669	$6,708	$2,415	$4,293	$2,605	$1,669	$3,357	$8,699
1998	$9,213	$17,592	$1,759	$7,454	$2,683	$4,770	$2,177	$1,759	$4,353	$10,668
1999	$10,750	$18,129	$1,813	$8,938	$3,218	$5,720	$2,335	$1,813	$5,198	$12,767
2000	$11,002	$18,640	$1,864	$9,138	$3,290	$5,848	$2,311	$1,864	$5,402	$14,715
2001	$11,707	$18,876	$1,888	$9,820	$3,535	$6,284	$2,387	$1,888	$5,785	$16,577

COLUMN EXPLANATION

w	n
x	t
y	u
z	w - y
aa	z * .36
ab	z - aa
ac	s
ad	y
ae	ab - ac + ad
af	NPV(12%,ae)

TABLE 5

RESIDUAL AND FAIR MARKET VALUE OF 2 NATIONWIDE CELLULAR SYSTEMS

		(MILLIONS)
ag	12 TIMES OPERATING PROFITS (2001)	$140,485.04
ah	LESS CAPITAL GAINS TAX	$50,574.62
ai	FUTURE RESIDUAL	$89,910.43
aj	12% PRESENT RESIDUAL	$28,948.75
ak	CUMULATIVE CASH FLOW	$16,577.25
al	FAIR MARKET VALUE	$45,526.00
am	VALUE PER POP/ONE SYSTEM	$89.27

COLUMN EXPLANATION

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ag	12 * w(for year 2001); liberal estimate of salvage value 10 years out.
ah	ag * .36
ai	ag - ah
aj	NPV(12%, ai)
ak	af(for year 2001)
al	aj + ai
am	al/2a(for 2 systems in year 1992); this calculation compares conservatively with the per pop valuations based on the prices of publicly traded cellular stock and cellular market transactions.

TABLE 6

CONSUMER LOSSES ATTRIBUTABLE TO OVEREARNINGS

YEAR	AFTER TAX CASH FLOW (MILLIONS)	NET PLANT (MILLIONS)	AFTER TAX RATE OF RETURN ON NET PLANT	AFTER TAX CASH FLOW AT 15% ROR ON NET PLANT (MILLIONS)	OVER EARNINGS (MILLIONS)	PER MINUTE SAVINGS AT 15% ROR	CUMUL. OVER EARNINGS (MILLIONS)	CUMULATIVE OVER EARNINGS PV AT 12% (MILLIONS)
	am	an	ao	ap	aq	ar	as	at
1992	$1,488	$6,936	21%	$1,040	$447	$0.04	$447	$447
1993	$1,413	$7,896	18%	$1,184	$229	$0.02	$676	$582
1994	$1,763	$8,946	20%	$1,342	$421	$0.03	$1,097	$881
1995	$2,402	$9,910	24%	$1,486	$916	$0.06	$2,013	$1,463
1996	$3,104	$10,732	29%	$1,610	$1,494	$0.08	$3,507	$2,311
1997	$3,357	$11,668	29%	$1,750	$1,607	$0.08	$5,114	$3,125
1998	$4,353	$12,085	36%	$1,813	$2,540	$0.12	$7,654	$4,274
1999	$5,198	$12,608	41%	$1,891	$3,307	$0.15	$10,961	$5,610
2000	$5,402	$13,054	41%	$1,958	$3,443	$0.16	$14,404	$6,852
2001	$5,785	$13,554	43%	$2,033	$3,752	$0.17	$18,156	$8,060

COLUMN EXPLANATION

am	ae
an	v
ao	am/an
ap	.15 * an
aq	am - ap
ar	aq/(12 * d * c)
as	cumulative total of aq
at	NPV(12%, aq)

CERTIFICATE OF SERVICE

I, Elizabeth S. Johnson, hereby certify that on March 19, 1993, a copy of the foregoing **Comments of The National Cellular Resellers Association** was mailed, first-class mail, postage prepaid to the following:

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